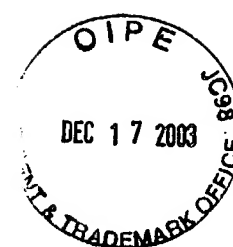


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2861
Docket No. 215810US3



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

IN RE APPLICATION OF: Hiroshi KOIDE

SERIAL NO: 09/985,741

GAU: 2861

FILED: November 6, 2001

EXAMINER: PHAM, HAI CHI

FOR: DEVICE FOR DRIVING AN ENDLESS BELT AND IMAGE FORMING APPARATUS USING THE SAME

INFORMATION DISCLOSURE STATEMENT UNDER 37 CFR 1.97

COMMISSIONER FOR PATENTS
ALEXANDRIA, VIRGINIA 22313

SIR:

Applicant(s) wish to disclose the following information.

REFERENCES

- ☐ The applicant(s) wish to make of record the references listed on the attached form PTO-1449. Copies of the listed references are attached, where required, as are either statements of relevancy or any readily available English translations of pertinent portions of any non-English language references.
- ☐ A check or credit card payment form is attached in the amount required under 37 CFR §1.17(p).

RELATED CASES

- ☒ Attached is a list of applicant's pending application(s) or issued patent(s) which may be related to the present application. A copy of the claims and drawings of the pending application(s) is attached.
- ☐ A check or credit card payment form is attached in the amount required under 37 CFR §1.17(p).

CERTIFICATION

- ☐ Each item of information contained in this information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of this statement.
- ☒ No item of information contained in this information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application or, to the knowledge of the undersigned, having made reasonable inquiry, was known to any individual designated in 37 CFR §1.56(c) more than three months prior to the filing of this statement.

DEPOSIT ACCOUNT

- ☒ Please charge any additional fees for the papers being filed herewith and for which no check or credit card payment is enclosed herewith, or credit any overpayment to deposit account number 15-0030. A duplicate copy of this sheet is enclosed.

Respectfully submitted,

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LIST OF RELATED CASES

<u>Docket Number</u>	<u>Serial or Patent Number</u>	<u>Filing or Issue Date</u>	<u>Inventor/ Applicant</u>
215810US3*	09/985,741	11/06/01	KOIDE
242591US2	10/663,766	09/17/03	TAKUROH

RECEIVED

DEC 24 2003

TC 2800 MAIL ROOM

WHAT IS CLAIMED IS:

Claim 1. A belt driving device comprising:

a plurality of rollers including a driving roller;

a belt configured to be tensioned by said plurality of rollers, and to be driven by said

5 driving roller;

wherein said driving roller is arranged adjacent to where an outside body contacts an
outer surface of said belt.

Claim 2. A belt driving device according to claim 1;

10 wherein said driving roller is arranged opposite said outside body across said belt.

Claim 3. A belt driving device according to claim 2;

wherein said outside body is configured to contact the belt to clean the outer surface
of said belt.

15

Claim 4. A belt driving device according to claim 2;

wherein said outside body is composed of a roller.

Claim 5. A belt driving device according to claim 1;

20 wherein said belt is configured to support toner images on its surface.

Claim 6. A belt driving device according to claim 1;

wherein said belt is configured to convey a recording medium.

25

FOR INFORMATION
DISCLOSURE

Related Pending Application

Related Case Serial No: 10/663,766

Related Case Filing Date: 09-17-03

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Claim 7. A belt driving device according to claim 6;
wherein said outside body is said recording medium; and
said driving roller is arranged opposite where said recording medium starts to be
conveyed on said belt.

5

Claim 8. A belt driving device according to claim 7;
wherein back-end of said recording medium is nipped by resist rollers when said
recording medium starts to be conveyed on said belt.

10 Claim 9. A belt driving device according to claim 1, further comprising;
a absorbing member configured to absorb shock applied to said driving roller or said
outside body.

15 Claim 10. A belt driving device according to claim 9;
wherein resonant frequency of said absorbing member is different from periodic
frequency of vibration caused by that said outside body contacts the outer surface of said belt.

20 Claim 11. A belt driving device comprising:
a plurality of rollers including a driving roller;
a belt configured to be tensioned by said plurality of rollers, and to be driven by said
driving roller;
a cleaning member configured to contact to clean an outer surface of said belt;
a pair of fluctuation absorbing members configured to absorb tensional fluctuation
25 of said belt at an upstream and a downstream of said cleaning member in a direction which

said belt is driven.

Claim 12. A belt driving device according to claim 11;

wherein said pair of fluctuation absorbing members comprising;

5 a pair of tension rollers configured to contact said belt at said upstream and said downstream respectively;

a pair of springs configured to bias said pair of tension rollers against said belt.

Claim 13. A belt driving device according to claim 12;

10 wherein resonant frequency of said fluctuation absorbing member is different from periodic frequency of vibration caused by that said outside body contacts the outer surface of said belt.

Claim 14. A driving device comprising:

15 a plurality of rollers including a driving roller;

a belt configured to be tensioned by said plurality of rollers, and to be driven by said driving roller;

a outside roller configured to contact an outer surface of said belt and to be driven by driving source;

20 a detecting means for detecting driving load of one of said driving roller and said outside roller;

a controller configured to drive another roller of said driving roller and said outside roller based on the driving load detected by said detecting means.

Claim 15. A driving device according to claim 14;
wherein said detecting means detects the driving load of said outside roller;
a controller configured to drive said driving roller based on the driving load detected
by said detecting means.

5

Claim 16. A driving device according to claim 14;
wherein said belt is configured to support toner images on its outer surface; and
said toner images are transferred onto a recording medium passing through between
said belt and said outside roller.

10

Claim 17. A driving device according to claim 15, further comprising;
a direct current motor configured to drive said driving roller;
wherein said detecting means detects a current of said direct current motor.

15

Claim 18. A driving device according to claim 14, further comprising;
wherein said controller drive said another roller so that a peripheral velocity of said
outside roller corresponds to a peripheral velocity of said driving roller.

20

Claim 19. A driving device comprising:
A plurality of rollers including a driving roller driven by a first motor;
a belt configured to be tensioned by said plurality of rollers, and to be driven by said
driving roller;
a outside roller configured to contact an outer surface of said belt and to be driven by
a second motor;

25

a controller configured to control said second motor by a less loop gain than a loop

gain to control the first motor.

Claim 20. A driving device according to claim 19;

wherein said belt is configured to support toner images on its outer surface; and

5 said toner images are transferred onto a recording medium passing through between
said belt and said outside roller.

Claim 21. An image forming apparatus comprising:

a plurality of rollers including a driving roller;

10 a belt configured to be tensioned by said plurality of rollers, and to be driven by said
driving roller;

wherein said driving roller is arranged adjacent to where an outside body contacts an
outer surface of said belt.

15 Claim 22. An image forming apparatus comprising:

a plurality of rollers including a driving roller;

a belt configured to be tensioned by said plurality of rollers, and to be driven by said
driving roller;

a cleaning member configured to contact to clean an outer surface of said belt;

20 a pair of fluctuation absorbing member configured to absorb tensional fluctuation of
said belt at an upstream and a downstream of said cleaning member in a direction which said
belt is driven.

Claim 23. An image forming apparatus comprising:

a plurality of rollers including a driving roller;

a belt configured to be tensioned by said plurality of rollers, and to be driven by said driving roller;

5 a outside roller configured to contact an outer surface of said belt and to be driven by driving source;

a detecting means for detecting driving load of one of said driving roller and said outside roller;

a controller configured to drive another roller of said driving roller and said outside
10 roller based on the driving load detected by said detecting means.

Claim 24. An image forming apparatus comprising:

a plurality of rollers including a driving roller by a first motor;

15 a belt configured to be tensioned by said plurality of rollers, and to be driven by said driving roller;

a outside roller configured to contact an outer surface of said belt and to be driven by a second motor;

a controller configured to control said second motor by a less loop gain than a loop gain by which said controller controls the first motor.

20

Claim 25. A image forming apparatus comprising:

a plurality of rollers including a driving roller by a first motor;

a belt configured to be tensioned by said plurality of rollers, and to be driven by said driving roller and to support toner images on its outer surface;

25 a outside roller configured to contact an outer surface of said belt and to be driven by

a second motor;

a controller configured to control said driving roller or said outside roller so to increase torque when a recording medium approaches or gets out between said belt and said outside roller;

5 wherein said toner images are transferred onto said recording medium passing through between said belt and said outside roller, further comprising;

Claim 26. A belt driving method for a belt tensed by the plurality of rollers including a driving roller, comprising:

10 driving said belt by said driving roller arranged adjacent to where an outside body contacts an outer surface of said belt.

Claim 27. A belt driving method for a belt tensed by the plurality of rollers including a driving roller, comprising:

15 driving said belt by said driving roller;

cleaning an outer surface of said belt by a cleaning member contacting the outer surface of said belt;

absorbing tensional fluctuation of said belt at an upstream and a downstream of said cleaning member in a direction which said belt is driven.

20

Claim 28. A driving method for a belt tensed by the plurality of rollers including a driving roller driven, comprising:

detecting driving load of one of said driving roller and a outside roller to contact an outer surface of said belt and to be driven by driving source;

25 driving another roller of said driving roller and said outside roller based on the

detected driving load.

Claim 29. A driving method for a belt tensed by the plurality rollers including a driving roller driven by a first motor, comprising:

5 driving said driving roller and a outside roller to contact an outer surface of said belt and to be driven by a second motor so that a loop gain to control said second motor is less than a loop gain to control said first motor.

Claim 30. An image forming method for a belt tensed by the plurality of rollers including a driving roller driven by a first motor, comprising:

10 driving said driving roller and a outside roller to contact an outer surface of said belt and to be driven by driving source;

transferring said toner images from an outer surface of said belt onto a recording medium passing through between said belt and said outside roller;

15 wherein increasing torque to drive said driving roller or said outside roller when said recording medium passes through between said belt and said outside roller.

ABSTRACT

A belt driving device is provided and includes a plurality of rollers including a driving roller. A belt is configured to be tensioned by the plurality of rollers, and to be driven by the driving roller. The driving roller is arranged adjacent to where an outside body contacts an outer surface of the belt. A pair of fluctuation absorbing members may be configured to absorb tensional fluctuation of the belt at an upstream and a downstream of a cleaning member in a direction which the belt is driven. A detecting means may be utilized to detect a driving load of one of the driving roller and the outside roller and a controller is configured to drive another roller of the driving roller and the outside roller based on the driving load detected by the detecting means. An outside roller may be configured to contact an outer surface of the belt and to be driven by a second motor; a controller configured to control the second motor by a less loop gain than a loop gain to control the first motor.

FIG. 1

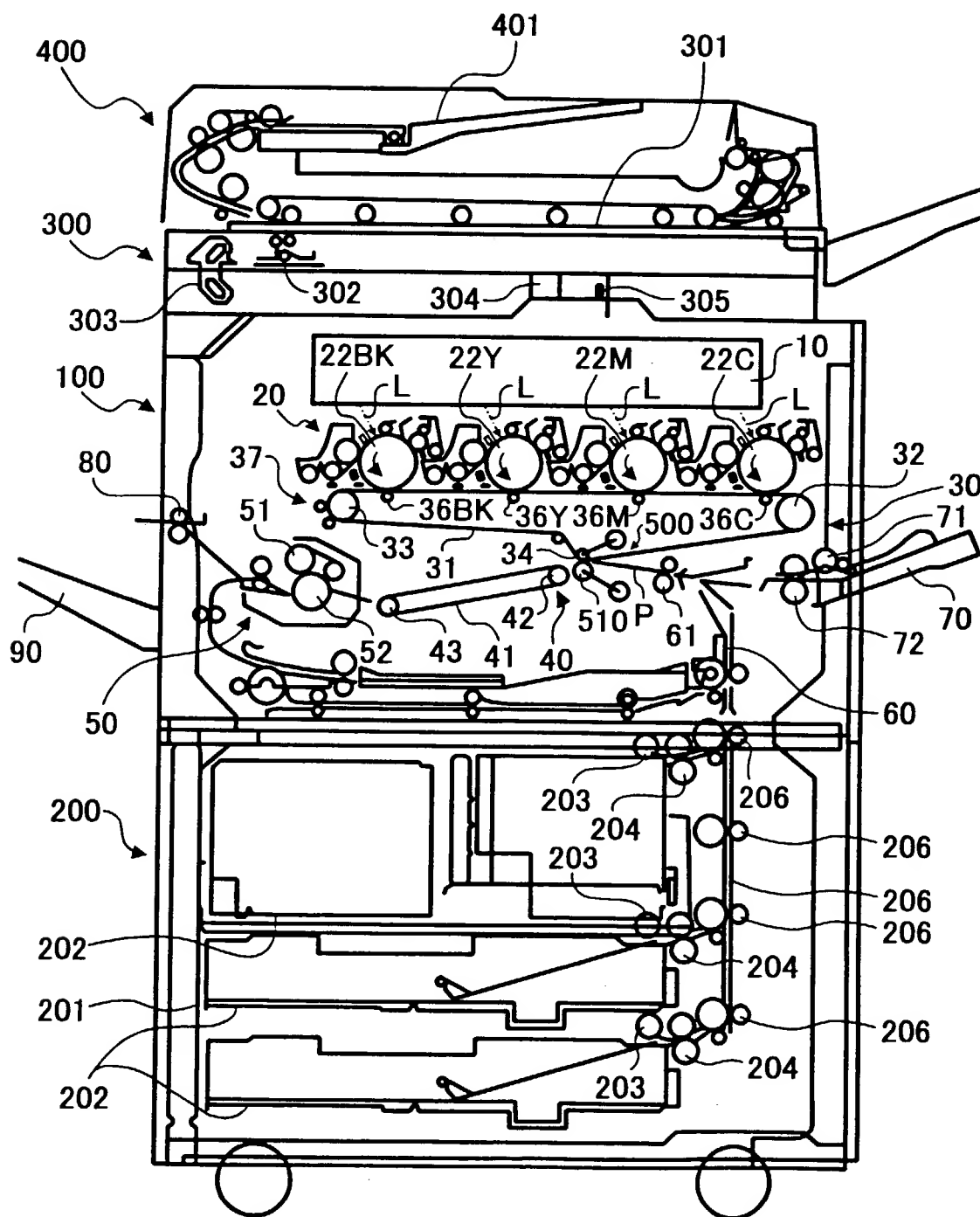


FIG. 2

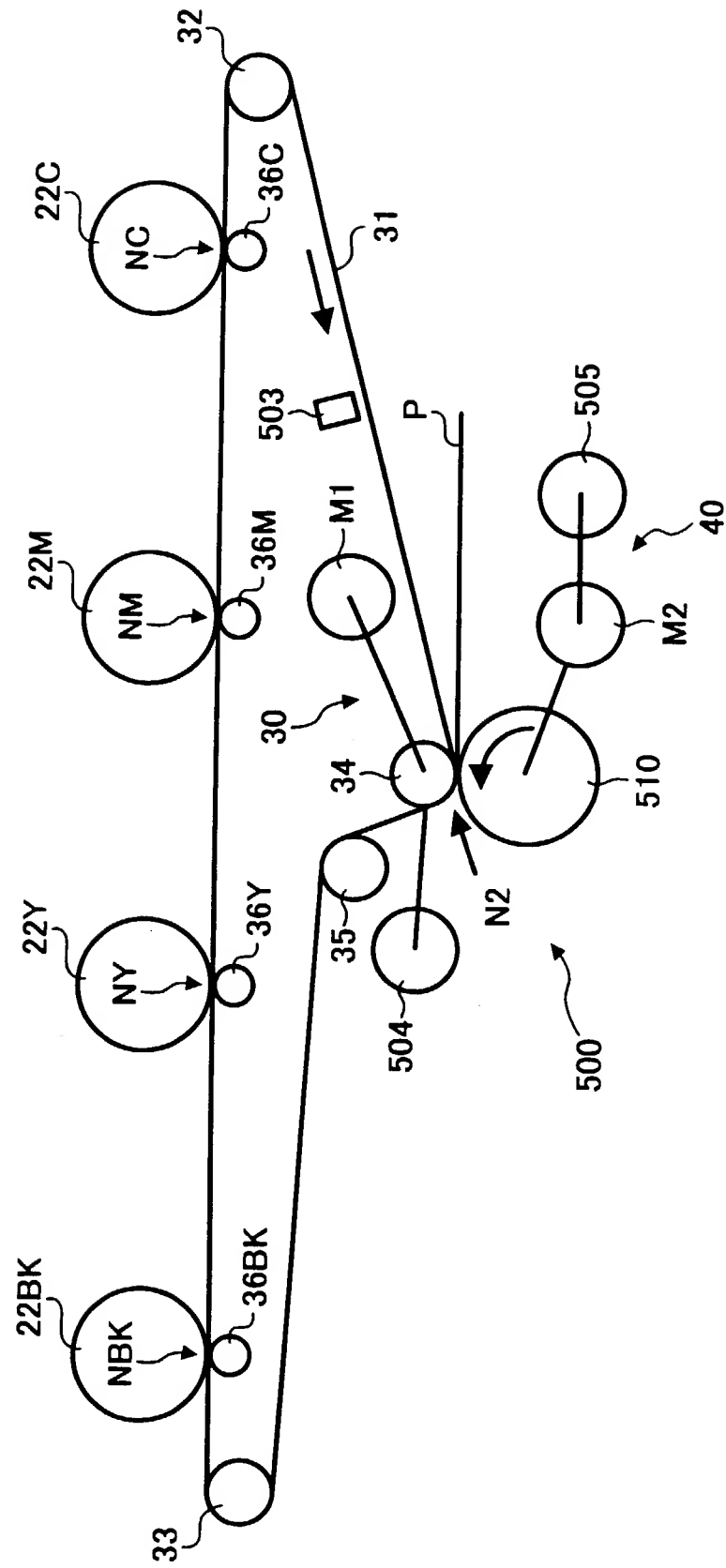


FIG. 3

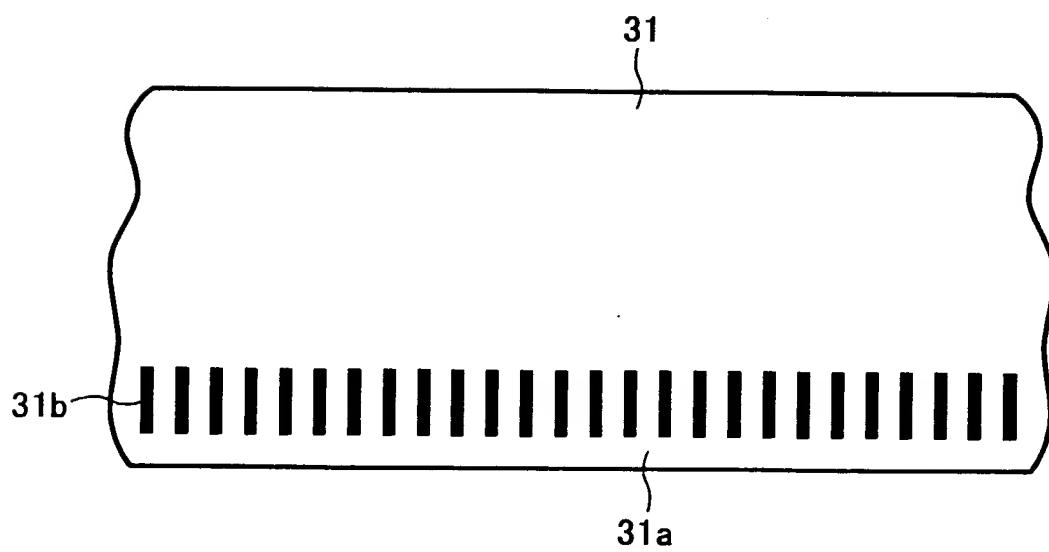


FIG. 4A

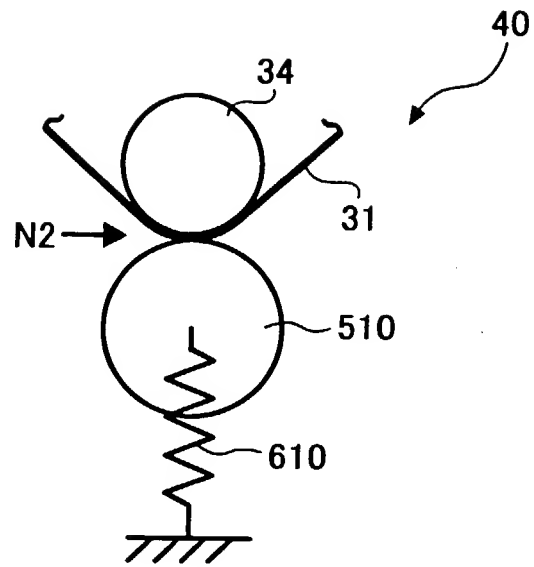


FIG. 4B

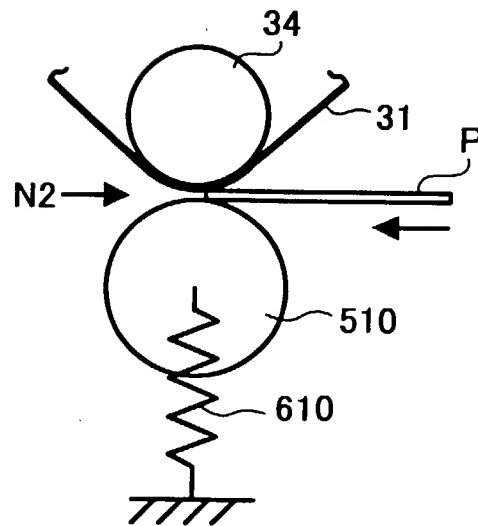


FIG. 4C

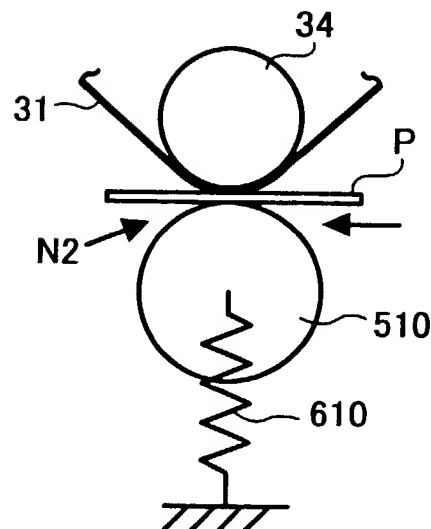


FIG. 5

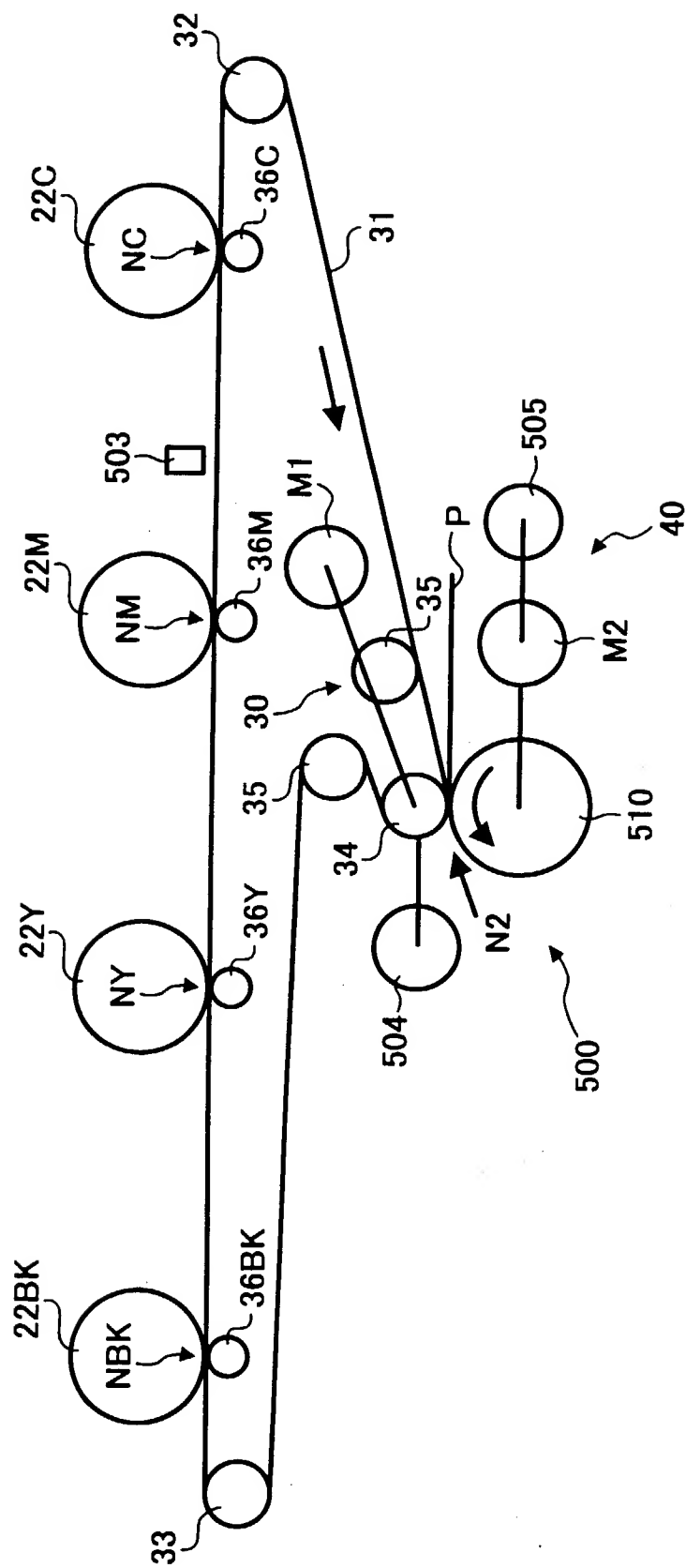


FIG. 6A

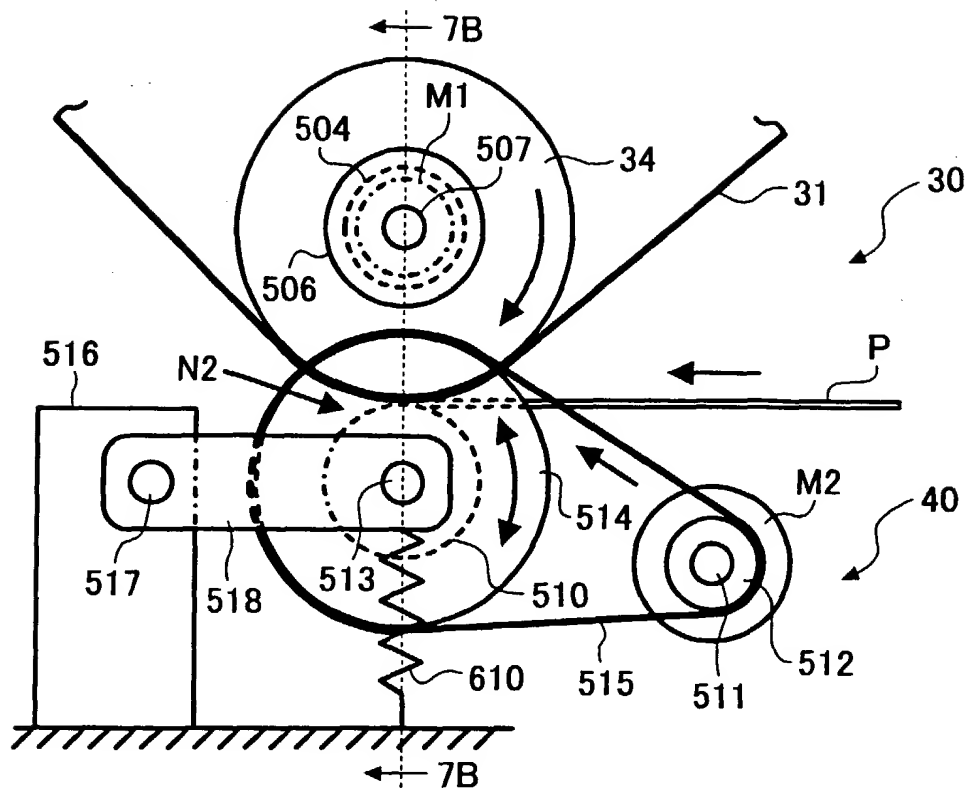


FIG. 6B

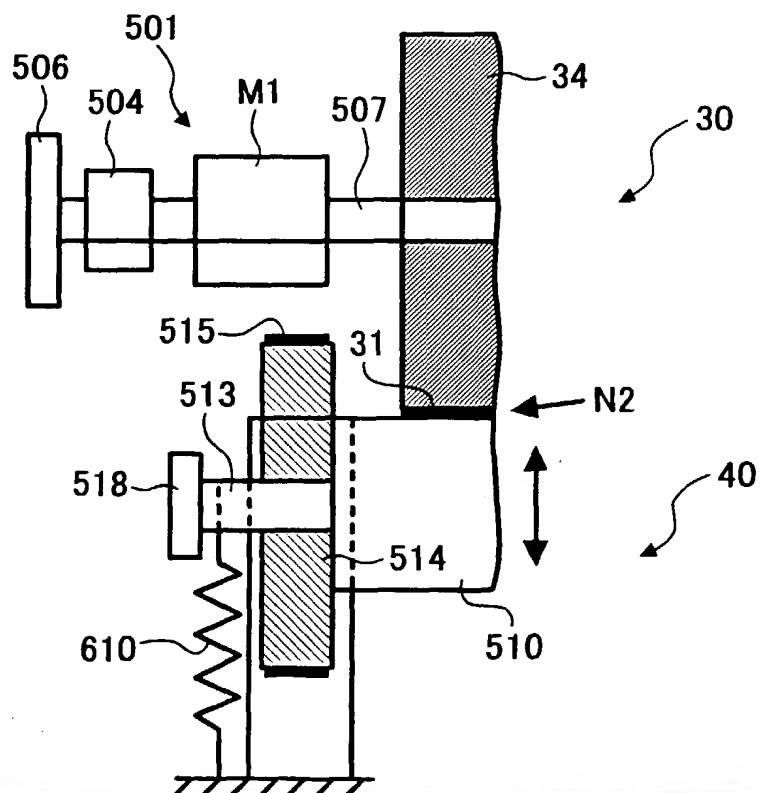


FIG. 7

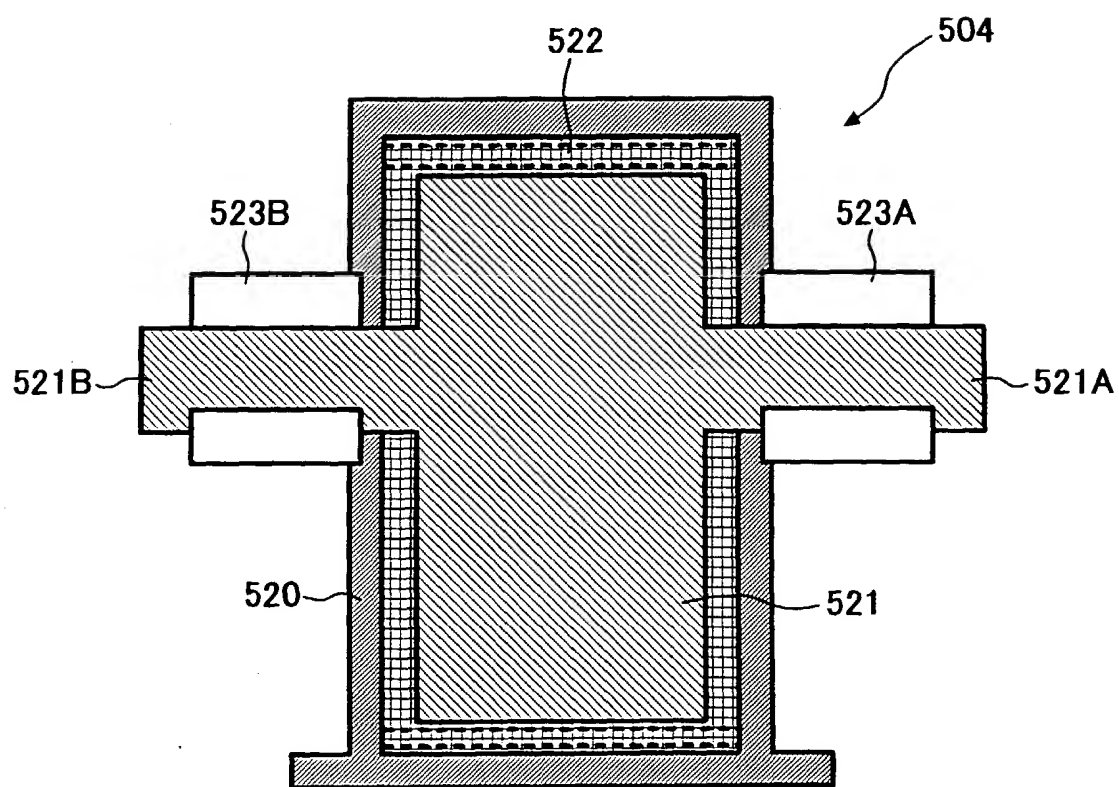


FIG. 8

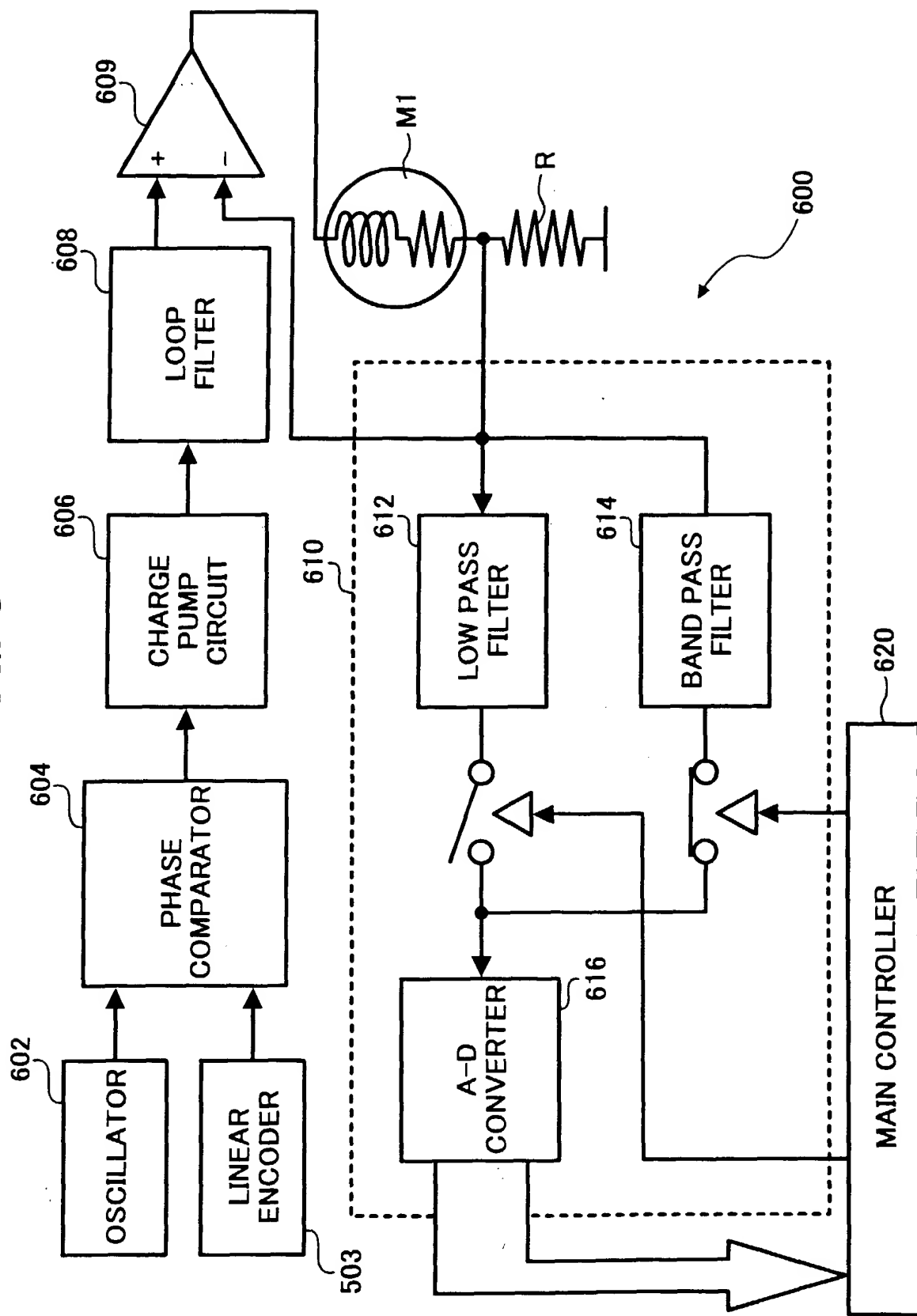


FIG. 9

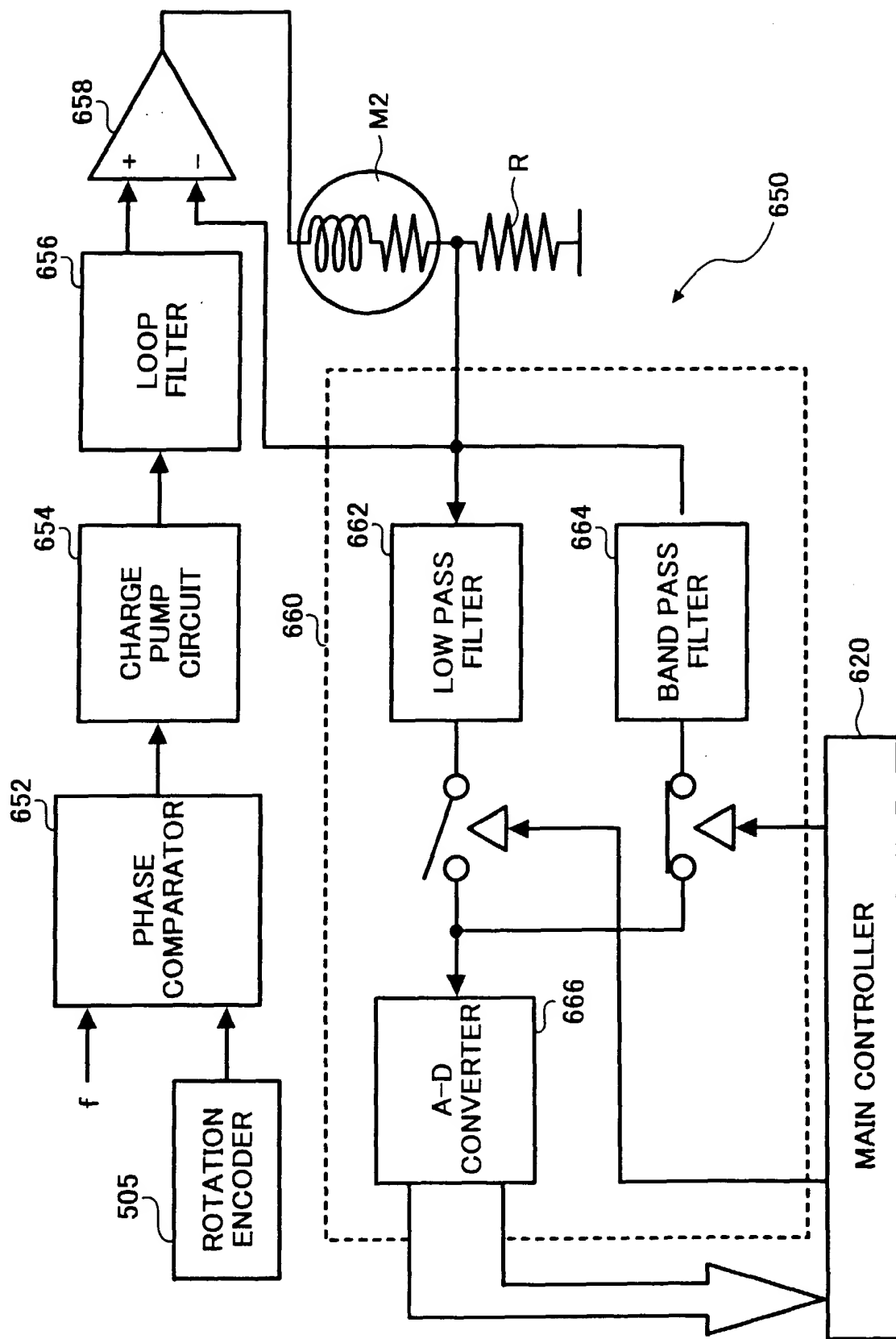


FIG.10

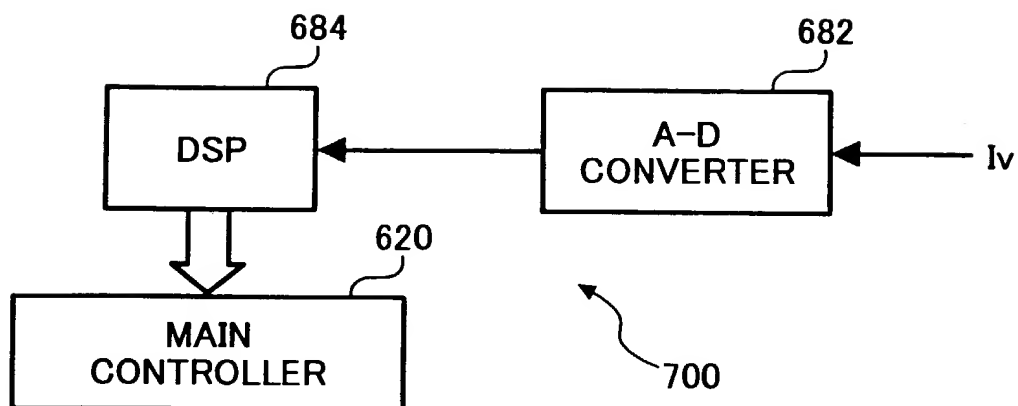


FIG. 11

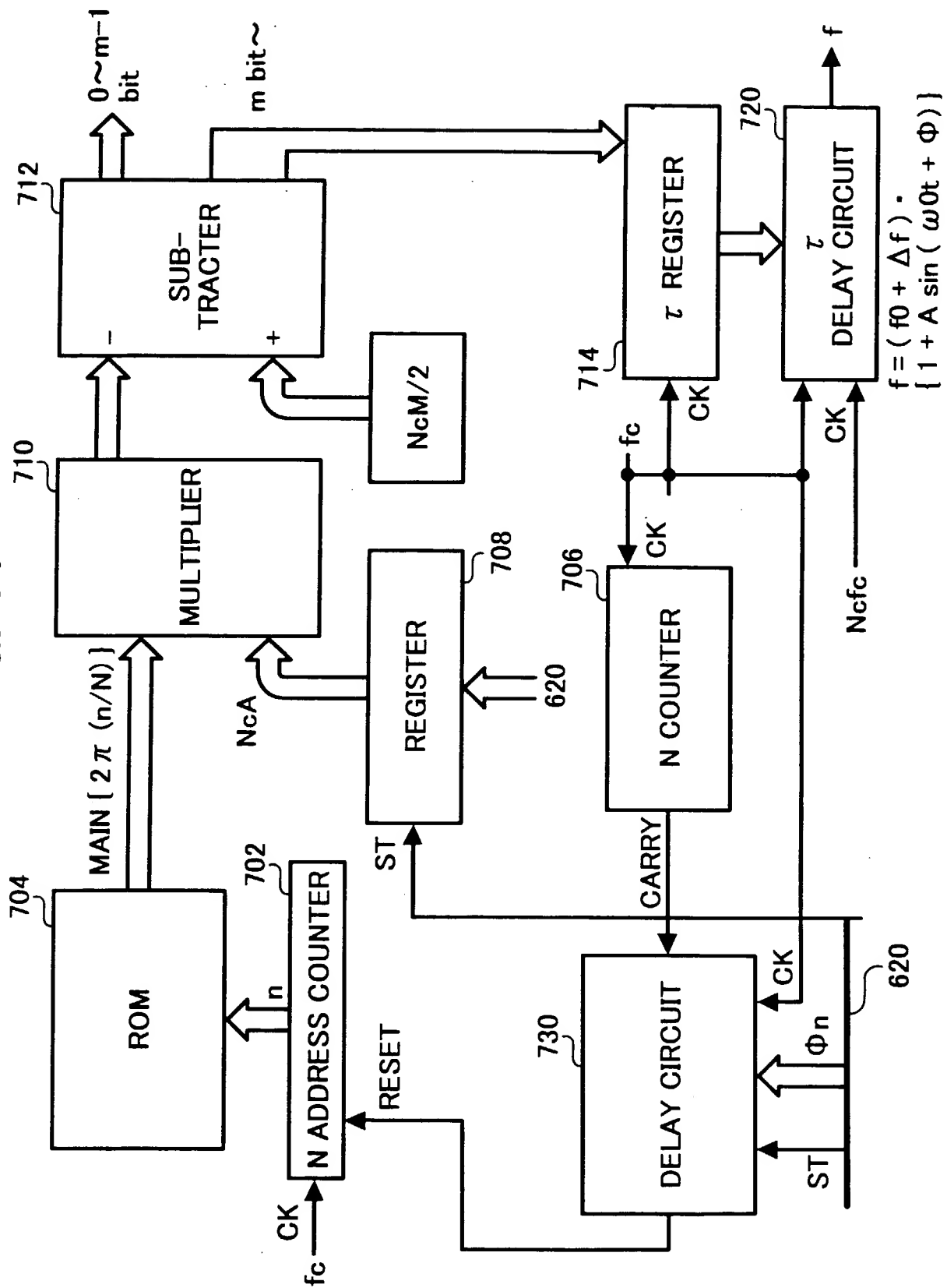


FIG.14

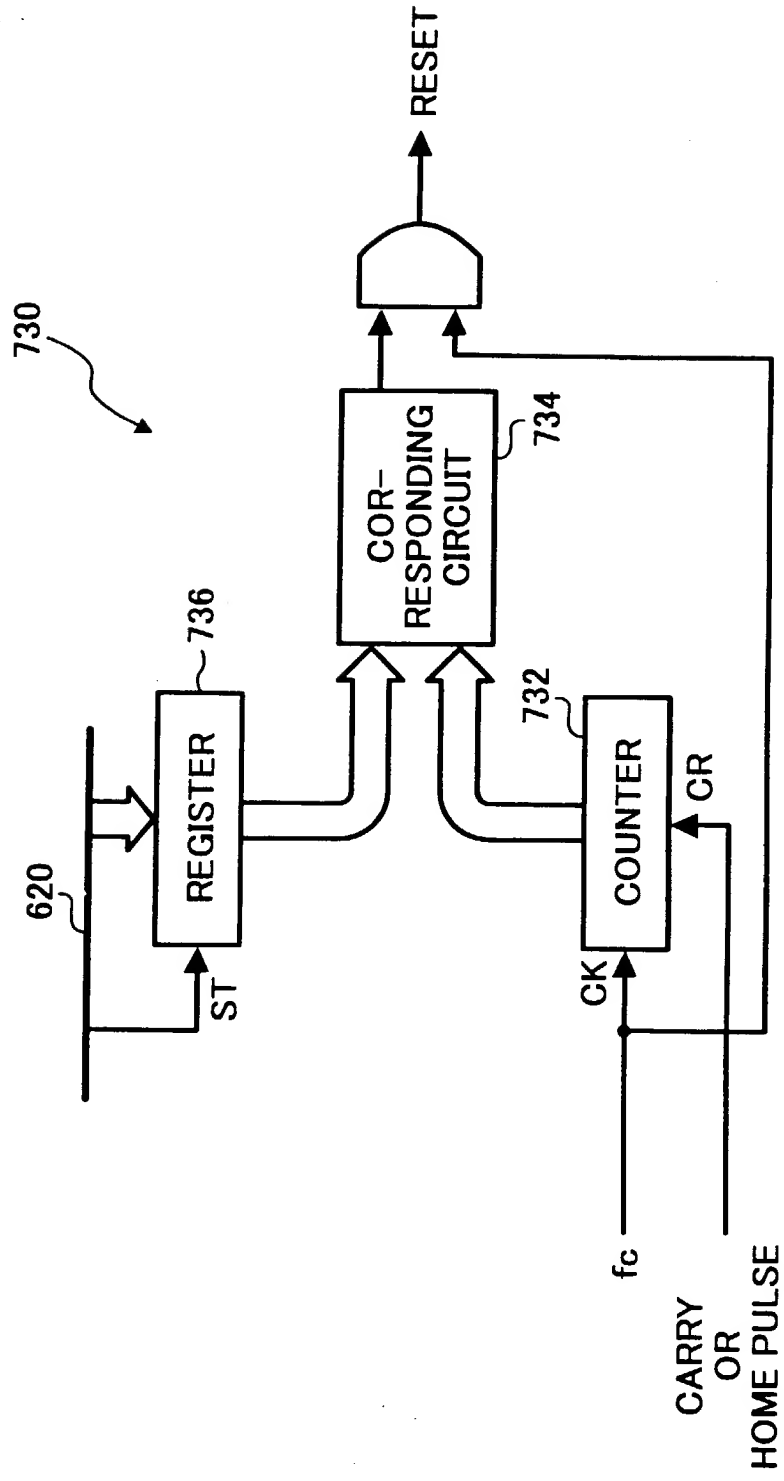


FIG. 15

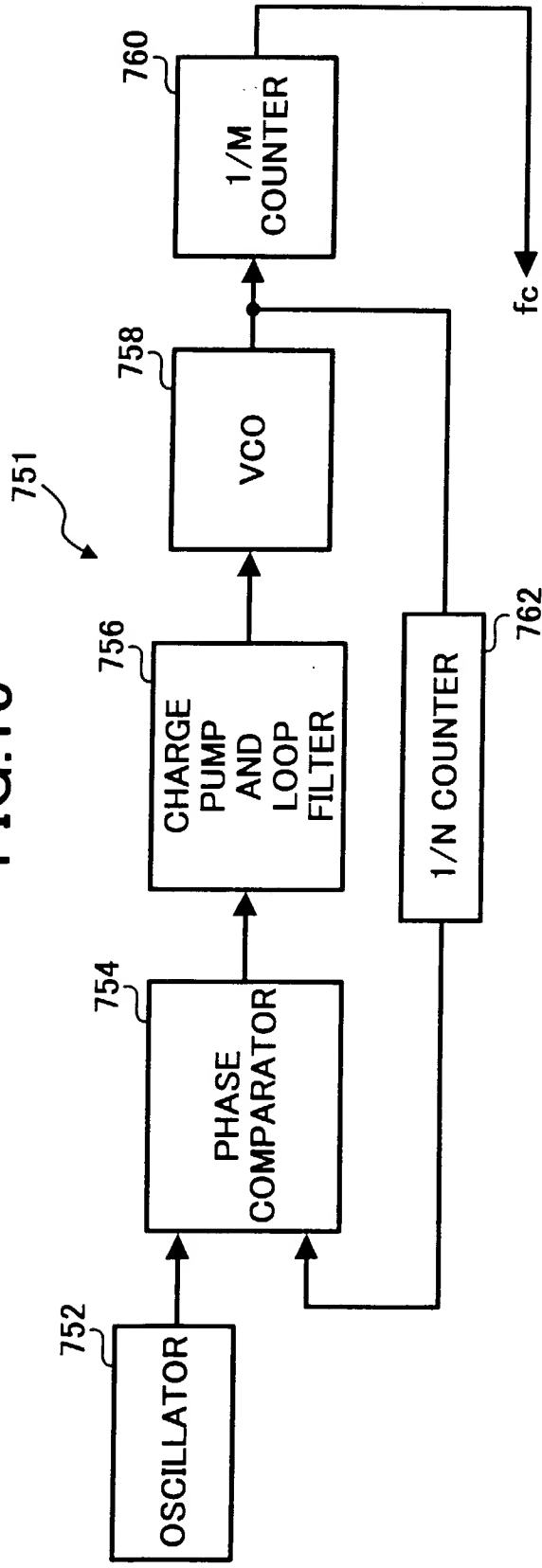


FIG. 16

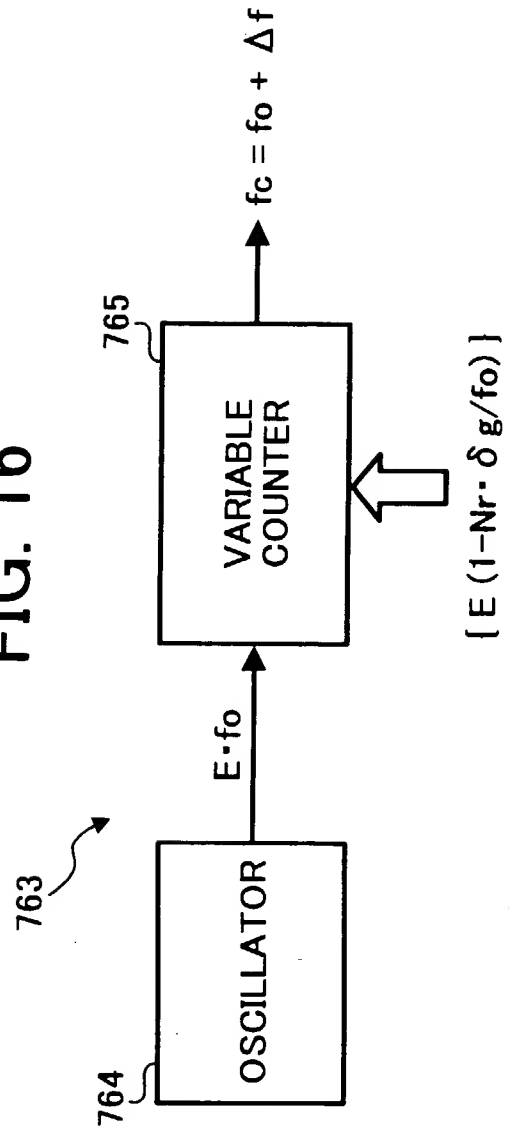


FIG. 17

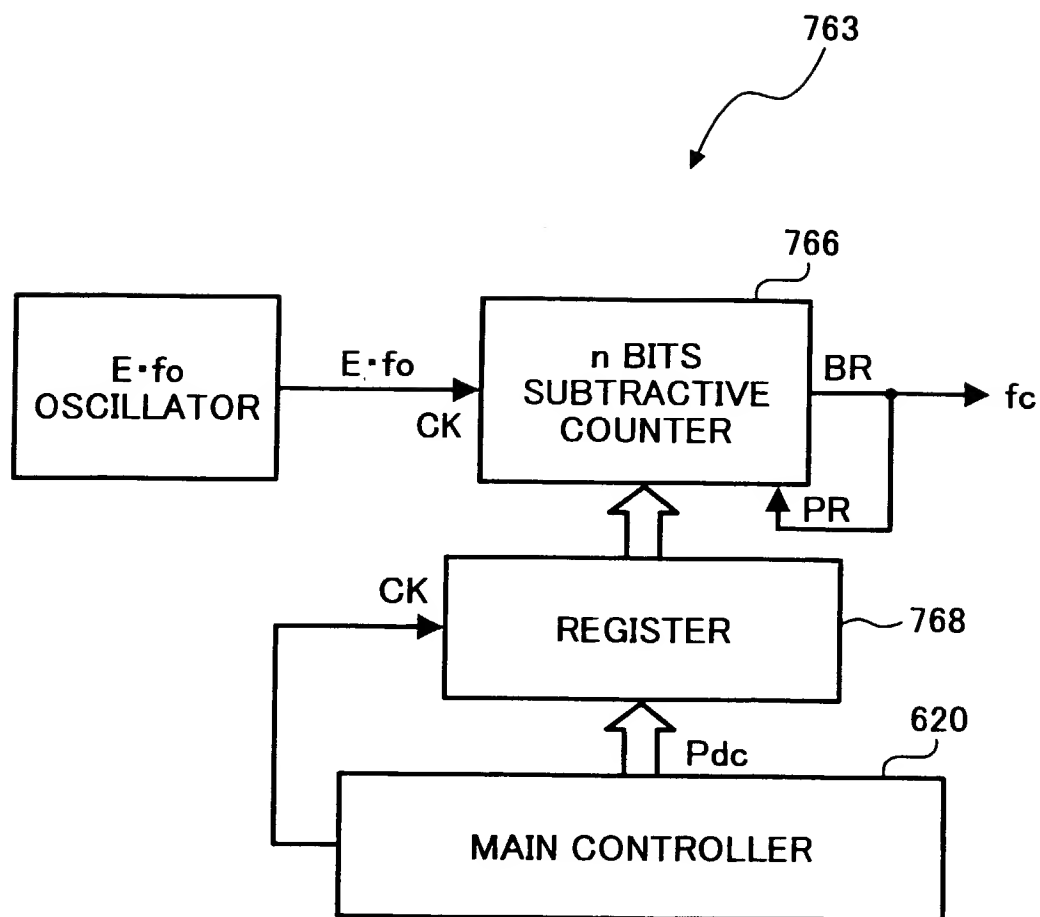


FIG. 18

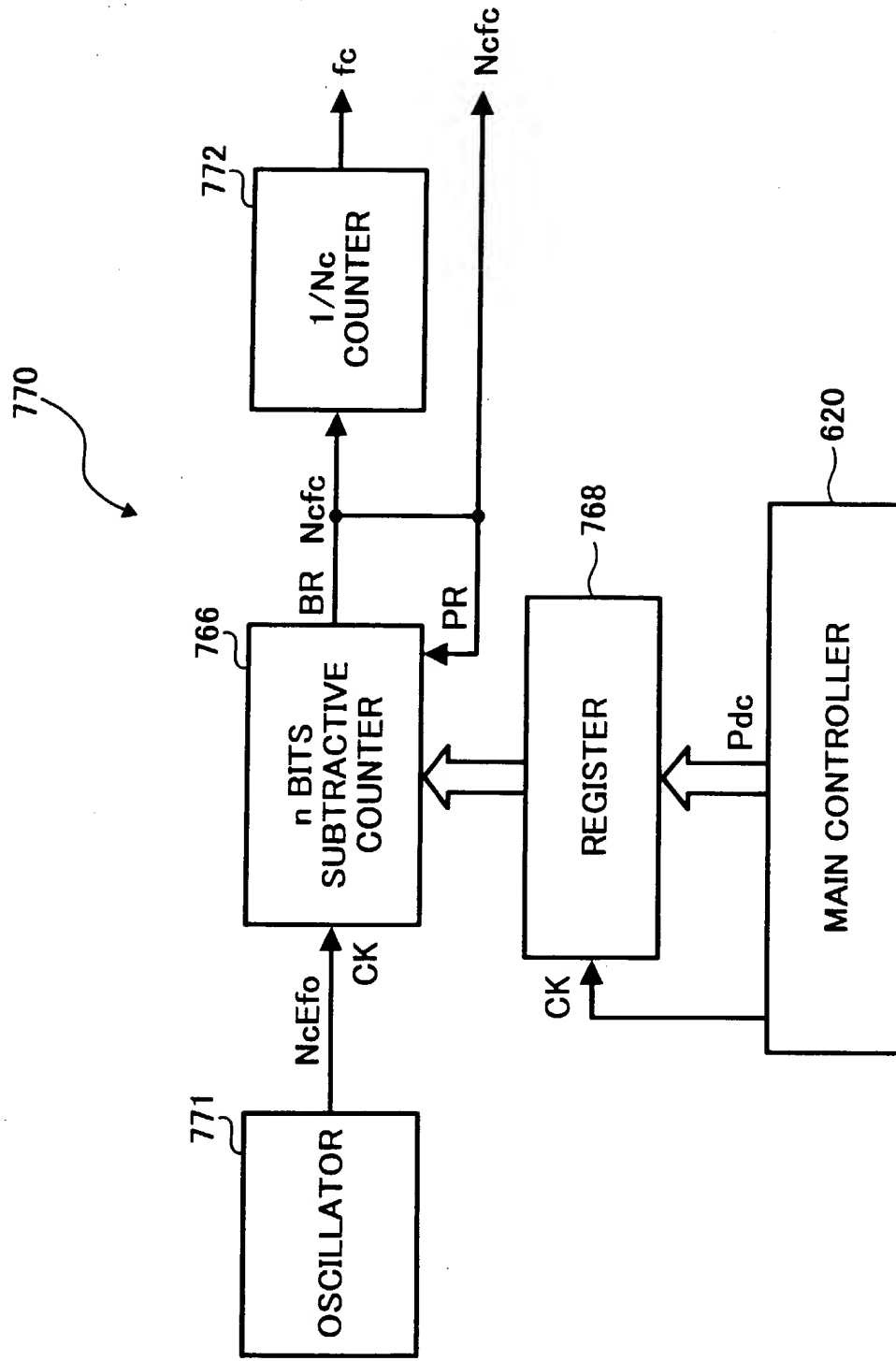


FIG. 19

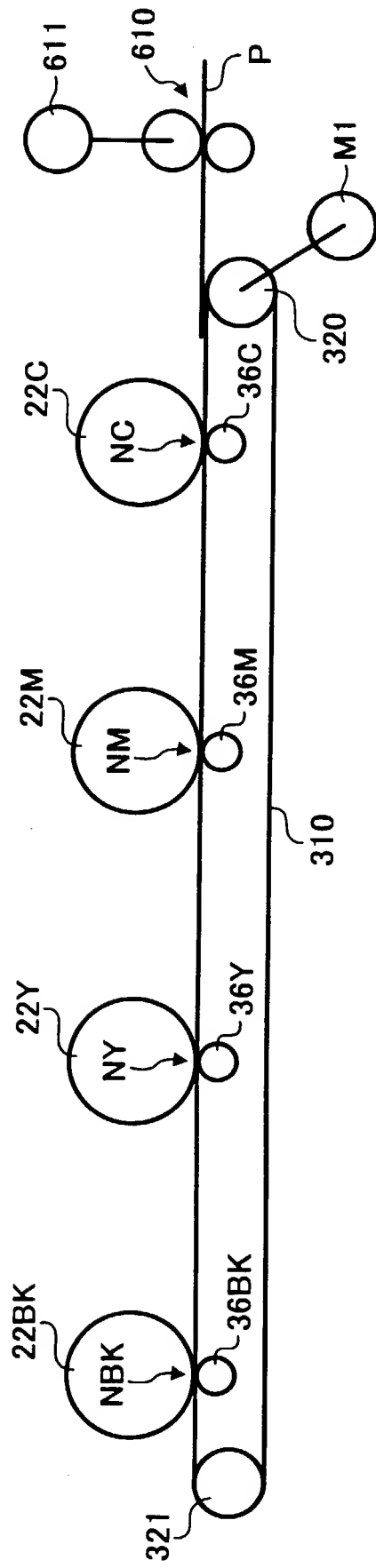


FIG. 20

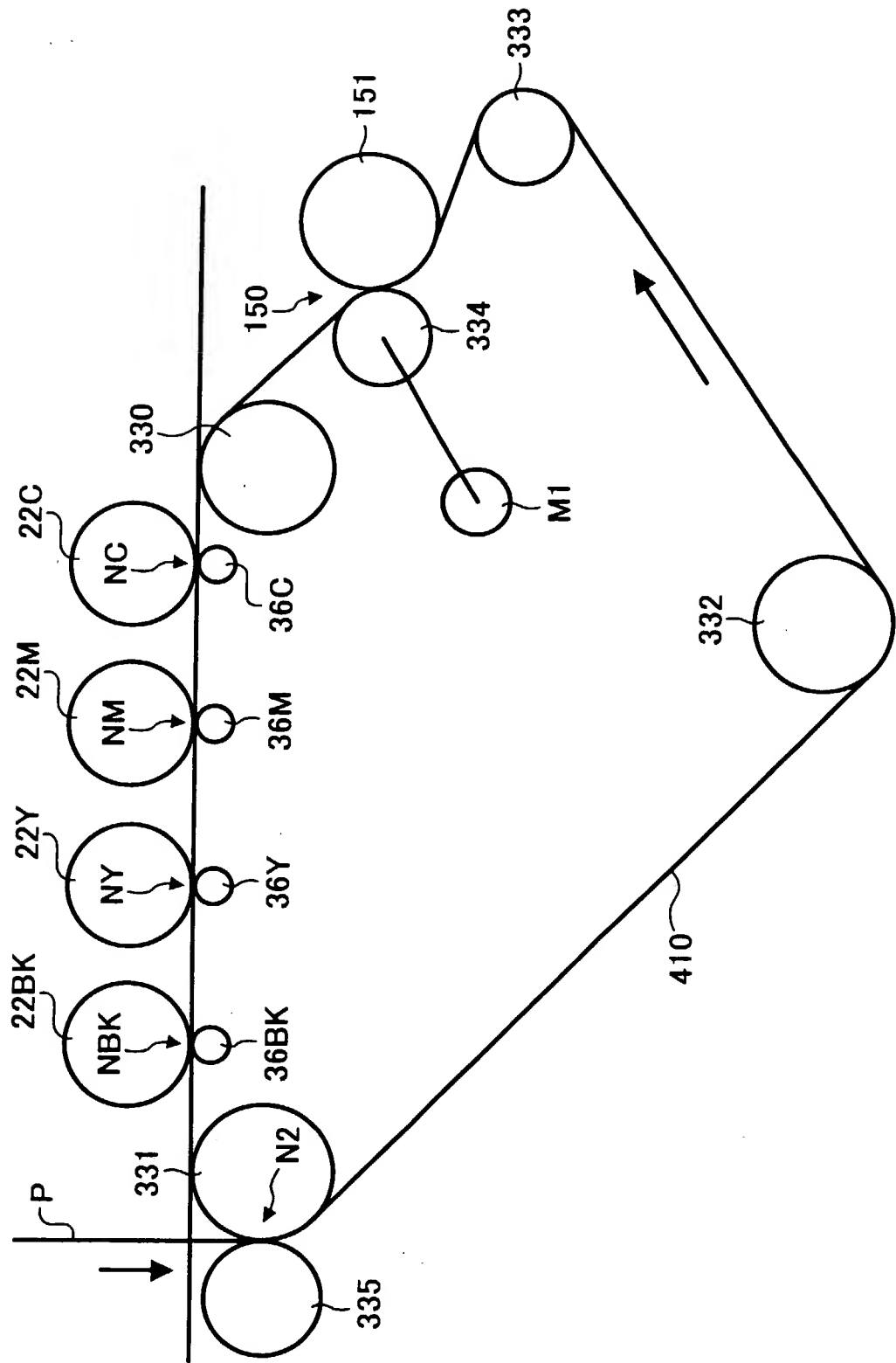


FIG. 21

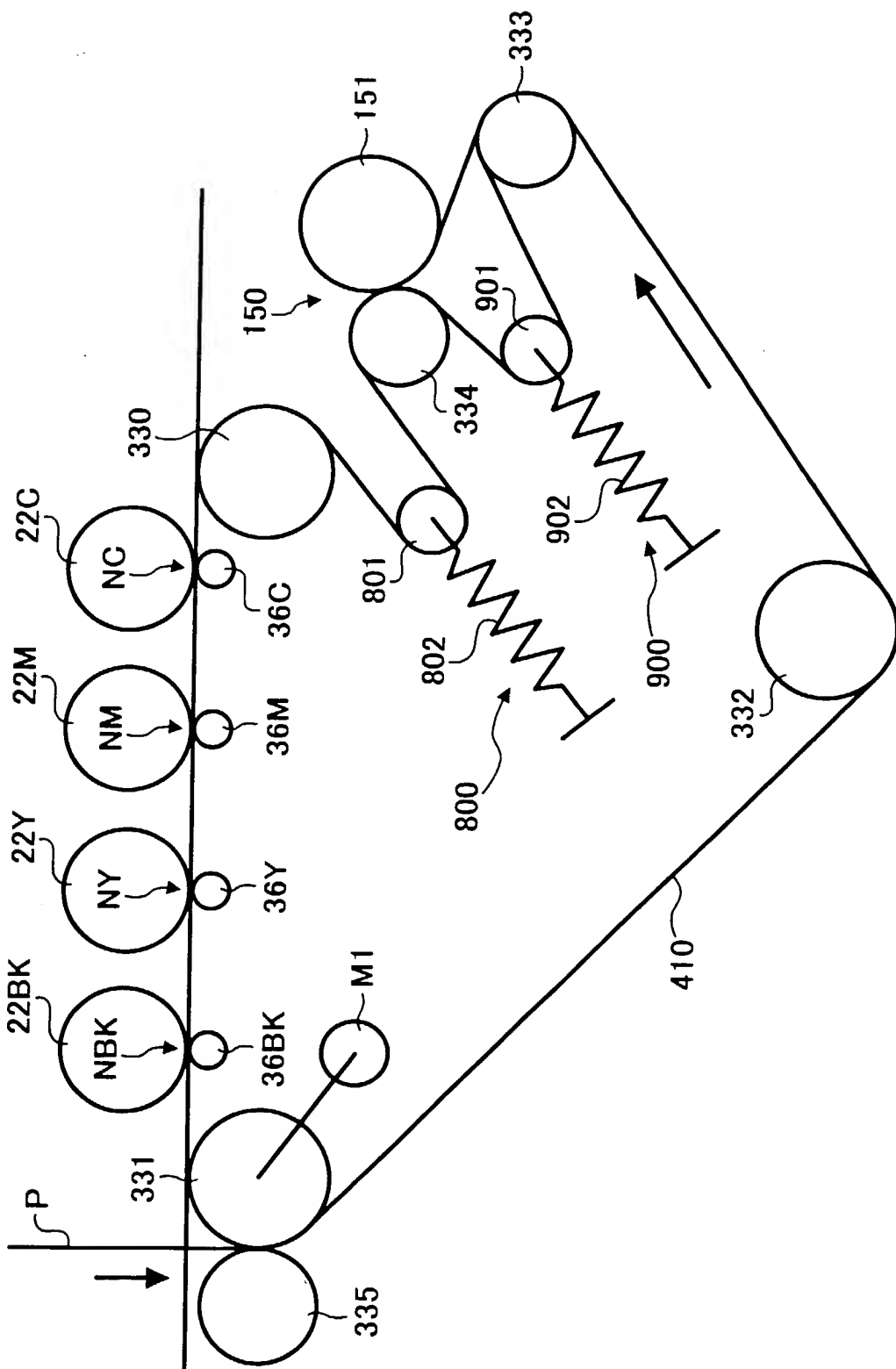


FIG. 22
PRIOR ART

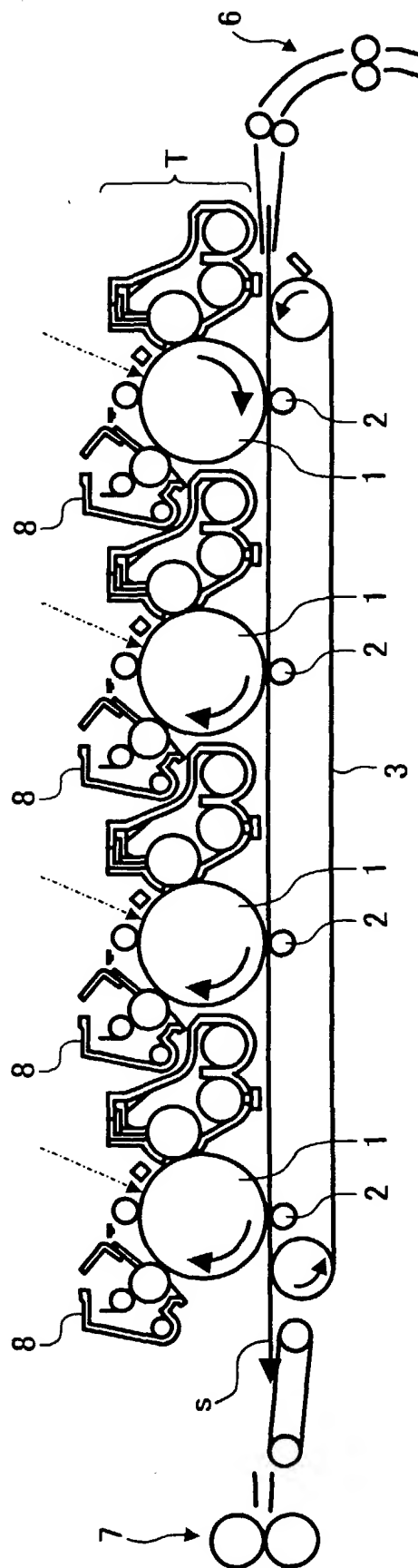


FIG. 23
PRIOR ART

